

pr light source

rev 0 1/10/01

TABLE 1 "Spectral Foot"

Light Source      Emiss Wave      Wavelength Region      Intensity

3M Deluxe Transparency Maker Light Source	400 - 1200	E, F, G, H, I, J, K	
558nm LED arrays	500 - 600	F, G	
569nm LED arrays	550 - 600	G	
590nm LED arrays	550 - 650	G, H	
602nm LED arrays	570 - 700	H	
615nm LED arrays	600 - 650	H	
637nm LED arrays	600 - 700	H, I	
644nm LED arrays	600 - 700	H, I	
Bluepoint	300 - 600, 940 - 1150	C, D, E, F, G	
Dental 3M-ESPE Elipar Trilight	400-500	D, E	
Dental 3M-ESPE Freelight LED	430-515	E	
Dental 3M LED Prototype	450-520	D, E, F	
Dental Akeda LUX-O-MAX LED	420 - 560	D, E, F	
Dental Apollo 95E Arc	440 - 520	E	
Dental Apollo E LED	420 - 550	E, F	
Dental Blue Light	400 - 500	D, E	
Dental LaserMed Accucure 3000 Laser	460 - 510	E	
Dental Yellow Light	370 - 800, 950 - 1100	E, F, G, H, I, J, K	
Flood Lamp	350 - 1200	D, E, F, G, H, I, J, K	
Fusion D Bulb	300 - 450, 500 - 600	B, C, D, F, G	
Fusion H Bulb	250 - 450, 550 - 600	A, B, C, D, G	
Fusion Q Bulb			
Fusion V Bulb	400 - 450, 550 - 600	D, G	
General Electric Blacklight (black)	350 - 400	C	
General Electric Blacklight (white)	350, 400, 435, 545	C	
General Electric Cool Light	400 - 700, > 960	F, G, H	
General Electric Daylight	390 - 700	D, E, F, G, H	
General Electric Germicidal	253	A	
Gro & Sho Plant Light	400 - 700	D, E, F, G, H, I	
Kodak Carousel 5200 Projector	450 - 700, 950 - 1100	E, F, G, H, I, J, K	
Kodak Carousel 5600 Projector	450 - 750, 950 - 1100	E, F, G, H, I, J, K	
Lesco Light (with new filter)	300 - 650	B, C, D, E, F, G, H	
Lesco Light (with old filter)	285 - 500, 570 - 600	B, C, D, E, G	
NIS Black Light Blue	300 - 400	B, C	
PDSC 2920 200W Hg Light	300 - 450, 550 - 600	B, C, D, G	
PDSC 930 200W Hg Light	300 - 600	B, C, D, E, F, G	
Philips 3000K Ultralume	400 - 650, 970 - 1000, 1080 - 1100	D, E, F, G, H, K	

Figure 1

Name	Solvent Used	Curing Mechanism	Abs. Wavelength (nm)	Wavelength Region	Lambda max (nm)	Ext. Coef (W%)	Real Ext. (l/mo cm)
<b>Initiator</b>							
6 methyl 2,4 bistrichloro methyl s triazine	Acetonitrile	R	<350	A,B	272	13	
CD 1010 (triarylsulfonium SbF6)	Acetonitrile	C	<350	A,B	300	80	
CD1011 (triarylsulfonium PF6)	Acetonitrile	C	<350	A,B	300	100	
CD1012 (diaryliodonium SbF6)	Acetonitrile	C	<330	A	250	150	
CpFe (benzene) PF6	Acetonitrile	C	<350	A,B,C,D,E,F	240	258	
CpFe (durene) SbF6	Acetonitrile	C	<350	A,B,C,D,E	244	184	
CpFe (HEB) SbF6	Acetonitrile	C	<350	A,B,C,D,E,F	324	13	
CpFe (Mes) PF6	Acetonitrile	C	<350	A,B	244	231	
CpFe (Mes) SbF6	Acetonitrile	C	<350	A,B	244	188	
CpFe (Nap) SbF6	Acetonitrile	C	<400	A,B,C,D,E,F,G	220	400	
CpFe (pyrene) SbF6	Acetonitrile	C	<500	A,B,C,D,E,F,G	334	295	
CpFe (toluene) PF6	Acetonitrile	C	<350	A,B,C,D,E	242	257	
CpFeXyl CF3SO3	Acetonitrile	C	<350	A,B,C,D,E	242	278	
CpFeXyl PF6	Acetonitrile	C	<350	A,B,C,D	242	254	
CpFeXyl SbF6	Acetonitrile	C	<350	A,B,C,D	242	205	
Darocur 4265	Acetonitrile	R	<400	A,B,C	380	6	172
Irgacure 1300	Acetonitrile	R	<400	A,B,C	320	141	5021
Irgacure 1700	Acetonitrile	R	<430	A,B,C	390	1.3	34
Irgacure 184	Acetonitrile	R	<370	A,B,C	326	3.5	92
Irgacure 261	Acetonitrile	R	<500	A,B,C,D,E	388	2	106
Irgacure 2959	Acetonitrile	C	<300	A	272	481	13839
Irgacure 369	Acetonitrile	R	260 - 400	A,B,C	320	456	21538
Irgacure 651	Acetonitrile	R	312 - 394	A,B,C	342	8	257
Irgacure 784	Acetonitrile	R	<550	A,B,C,D,E	395	19	1300
Irgacure 819	Acetonitrile	R	<450	A,B,C,D	370	17	918
Irgacure 907	Acetonitrile	R	250 - 350	A,B,C	304	492	17635
KB1	Acetonitrile	R	312 - 394	A,B,C	342	8	257
KI 85 (Purified triarylsulfonium PF6)	Acetonitrile	C	<350	A,B	290	56	
Triphenylsulfonium SbF6	Acetonitrile	C	<350	A,B	300	183	
Tris (N-itoso-n-phenylthodroxylamine)	Acetonitrile	R	350 - 500	A,B,C,D,E	350	36	
XL 353 (triazine)	Acetonitrile	R	270 - 400	A,B,C	352	280	
<b>Sensitizer</b>							
4-Benzophenonethiol	Acetonitrile	R	<350	A,B	294	640	
4,5-Dibromofluorescein	Acetonitrile	C,R	500 - 550	E,F	540	131	8277
4,5,6,7-Tetrachlorofluorescein in DI water	DI water	R,C	400 - 540	D,E,F	500	328	15,415
52926-36A (Cyanine Dye)	Acetonitrile	R,C	450 - 600	F	554	2511	
53968-41 (Cyanine Dye)	Acetonitrile	R,C	500 - 700	F,G,H,I	650	3772	
53968-42 (Quinoline Dye)	Acetonitrile	R,C	500 - 750	G,H,I,J,K	604,704	417,382	
9 - Fluorenone	Acetonitrile	C,R	<320	B,C	296	266	
Acridine Orange, hydrochloride hydrate	Acetonitrile	C,R	400 - 550	D,E	494	1439	55698
Acriflavine hydrochloride	Acetonitrile	C,R	400 - 500	D,E	458	615	
Azure A	Acetonitrile	C,R	500 - 700	G,H,I	630	1346	50380
Azure B	DI water	R,C	450 - 700	G,H,I	600,650	1200	36500
Azure C	Acetonitrile	C,R	500 - 650	G,H	608	748	26949

## Curing Resource Center

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## Views By Name

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Substrates  
(by Color)Light  
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UV Stabilizers

## Wavelength Region Views

Combined

Substrates

Light  
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Initiators

UV Stabilizers

## UV Stabilizer

Collapse

Expand

Name	Solvent Used	Abs. Wavelength (nm)	Wavelength Region	lambda max (nm)	Ext. Coef (W%)	Real Ext (U/mol cm)
<a href="#">Cytacorb UV9</a>	Acetonitrile	<380	A,B,C	288		495
<a href="#">Cytac 1164</a>	Acetonitrile	<380	A,B,C	292		584
<a href="#">Cytac 3381</a>	Acetonitrile	<260	A	204		227
<a href="#">Cytac 3604</a>	Acetonitrile	<270	A	204		220
<a href="#">Norbloc 7966</a>	Acetonitrile	<380	A,B,C	336		470
<a href="#">Tinuvin 1130</a>	Acetonitrile	<400	A,B,C	340		190
<a href="#">Tinuvin 144</a>	Acetonitrile	<300	A	276		16.7
<a href="#">Tinuvin 292</a>	Acetonitrile	<270	A	208		36
<a href="#">Tinuvin 384</a>	Acetonitrile	<400	A,B,C	340		253
<a href="#">Tinuvin 770DE</a>	Acetonitrile	<260	A	208		43
<a href="#">Tinuvin 900</a>	Acetonitrile	<400	A,B,C	342		272
<a href="#">Tinuvin P</a>	Acetonitrile	380	A,B,C	340		517
<a href="#">UV-24</a>	Acetonitrile	<400	A,B,C	286		330
<a href="#">Uvinul 4050H</a>	Acetonitrile	<260	A	206		280

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Figure 2A

Figure 3

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Substrate Tested	Color of Substrate	Thickness	Transmission WaveWavelength Region (nm)
3M Microflex 8025-1115 80-6104-6609-8	orange,Cu traces	2-2.8 mil	> 465 F,G,H,I,J,K
ABS (Sample 1)	cream,opaque	0.13	> 400 E,F,G,H,I,J,K
ABS (sample 2)	cream,opaque	0.122	> 400 F,G,H,I,J,K
Acrylic	colorless,clear	0.111	> 370 D,E,F,G,H,I,J,K
Al CD disk (40nm)	reflected mirror	40 nm	> 300 B,C,D,E,F,G,H,I,J,K
Al CD disk (45nm)	reflected mirror	45 nm	> 300 B,C,D,E,F,G,H,I,J,K
Al CD disk (50nm)	reflected mirror	50 nm	> 300 B,C,D,E,F,G,H,I,J,K
Al on BET	reflected mirror	3 mil	> 320 B,C,D,E,F,G,H,I,J,K
Alumina	opaque white	0.034	> 330 C,D,E,F,G,H,I,J,K
BT Epoxy	opaque brown	0.063	> 520 G,H,I,J,K
Canvas	natural	32 mil	> 400 D,E,F,G,H,I,J,K
Diamond Grade Sheeting	reflected mirror	22 mil	> 400 D,E,F,G,H,I,J,K
FR4 with green solder mask	green	0.062	> 400 E,F,I,J,K
GFRP precision punch	light yellowish-green,translucent	0.135	> 360 D,E,F,G,H,I,J,K
GFRP (FR4)	light yellowish-green,translucent	0.067	> 360 D,E,F,G,H,I,J,K
Glass slide	clear,colorless	0.222	> 310 C,D,E,F,G,H,I,J,K
Halar ethylene-chlorotrifluoroethylene ECTFE film	hazy colorless (off-white)	19 mil	230 - 275,> 280 A,B,C,D,E,F,G,H,I,J,K
HDPE	white	0.127	> 280 B,C,D,E,F,G,H,I,J,K
Kapton	orange,transparent	0.6 mil	> 435 E,F,G,H,I,J,K
Kynar polyvinylidene fluoride PVDF film	hazy colorless	15 mil	> 200 A,B,C,D,E,F,G,H,I,J,K
Mirror Multi-layer film	reflected mirror	2 mil	> 200 A,B,C,D,K
Multi-layer film	multi color	2 mil	>200 B,C,D,E,H,I,J,K
One layer Security System card	opaque white	21 mil	> 400 D,E,F,G,H,I,J,K
PC	opaque white	15 mil	415 - 530 ,> 600 E,H,I,J,K
PC Hyzod FD-9200	colorless,clear	0.116	> 280 C,D,E,F,G,H,I,J,K
PC Lexan 9034	colorless,clear	0.119	> 390 D,E,F,G,H,I,J,K
PCB w/ green solder mask (spl 1)	green,no traces,board only	0.033	400 - 600 ,> 660 E,F,I,J,K
PCB w/ green solder mask (spl 2)	green	0.066	400 - 610,>660 E,F,I,J,K
PCB w/ green solder mask (spl 3)	green	0.066	400 - 600 ,> 660 E,F,J,K
PCB w/ green solder mask (spl 4)	green,ground plane stripes 1/4" across	0.066	400 - 600 ,> 660 E,F,G,J,K
PCB w/ green solder mask (spl 5)	green (yellowish tone)	0.063	> 450 E,F,G,J,K
PCB w/ green solder mask (spl 6)	green (bluish tone)	0.068	400 - 600 ,> 670 E,F,J,K
PETG	opaque white	22 mil	> 400 D,E,F,G,H,I,J,K
Polyimide	opaque dark brown	0.074	> 520 G,H,I,J,K
Polypropylene	translucent white	0.128	> 280 C,D,E,F,G,H,I,J,K
Teflon	opaque white	0.161	> 200 A,B,C,D,E,F,G,H,I,J,K
TPX polymethylpentene PMP film	hazy colorless	11 mil	230 - 275 ,> 280 A,B,C,D,E,F,G,H,I,J,K
Two layer Security System Card	opaque white	13 mil	> 420 D,E,F,G,H,I,J,K
Udel polysulfone Thermalux film	hazy colorless (off-white)	10 mil	> 310 C,D,E,F,G,H,I,J,K
UHMWPE	sl translucent white	0.14	> 280 C,D,E,F,G,H,I,J,K
Ultem 1000 polyetherimide sample 1	amber,transparent	0.13	> 415 E,F,G,H,I,J,K
Ultem 1000 polyetherimide sample 2	amber,transparent	0.122	> 430 E,F,G,H,I,J,K
Ultem Tempalux Film	amber,transparent	8 mil	> 400 D,E,F,G,H,I,J,K
Ultem (filled) Mint-Pac by Circuit Wise	amber,translucent	0.064	> 410 F,G,H,I,J,K
Ultrason E polyethersulfone PES film	hazy amber	10 mil	> 300 C,D,E,F,G,H,I,J,K
UVPS	orange,transparent	3 mil	310 - 400,> 470 F,G,H,I,J,K
Victrex PEEK Film polyetheretherketone	amber,hazy transparent	10 mil	> 390 D,E,F,G,H,I,J,K
Vinyl card	opaque white	30 mil	> 410 D,E,F,G,H,I,J,K
Vinyl film	clear	7.5 mil	> 380 D,E,F,G,H,I,J,K

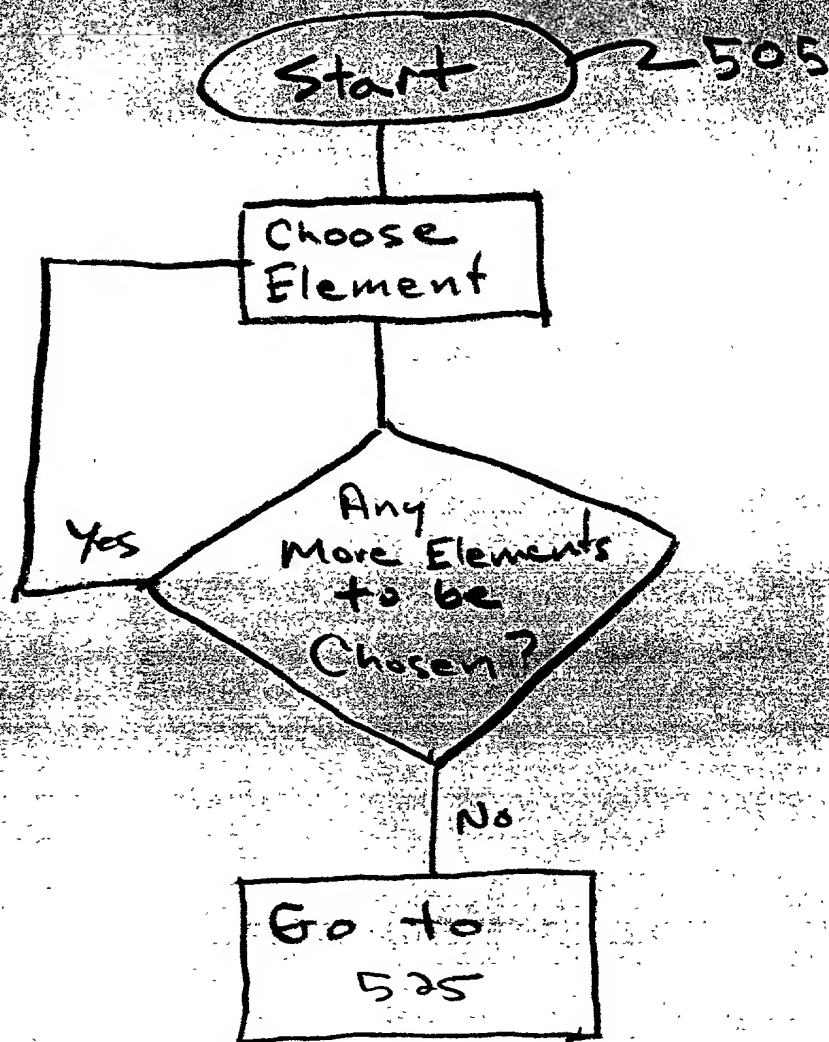


Figure 4A

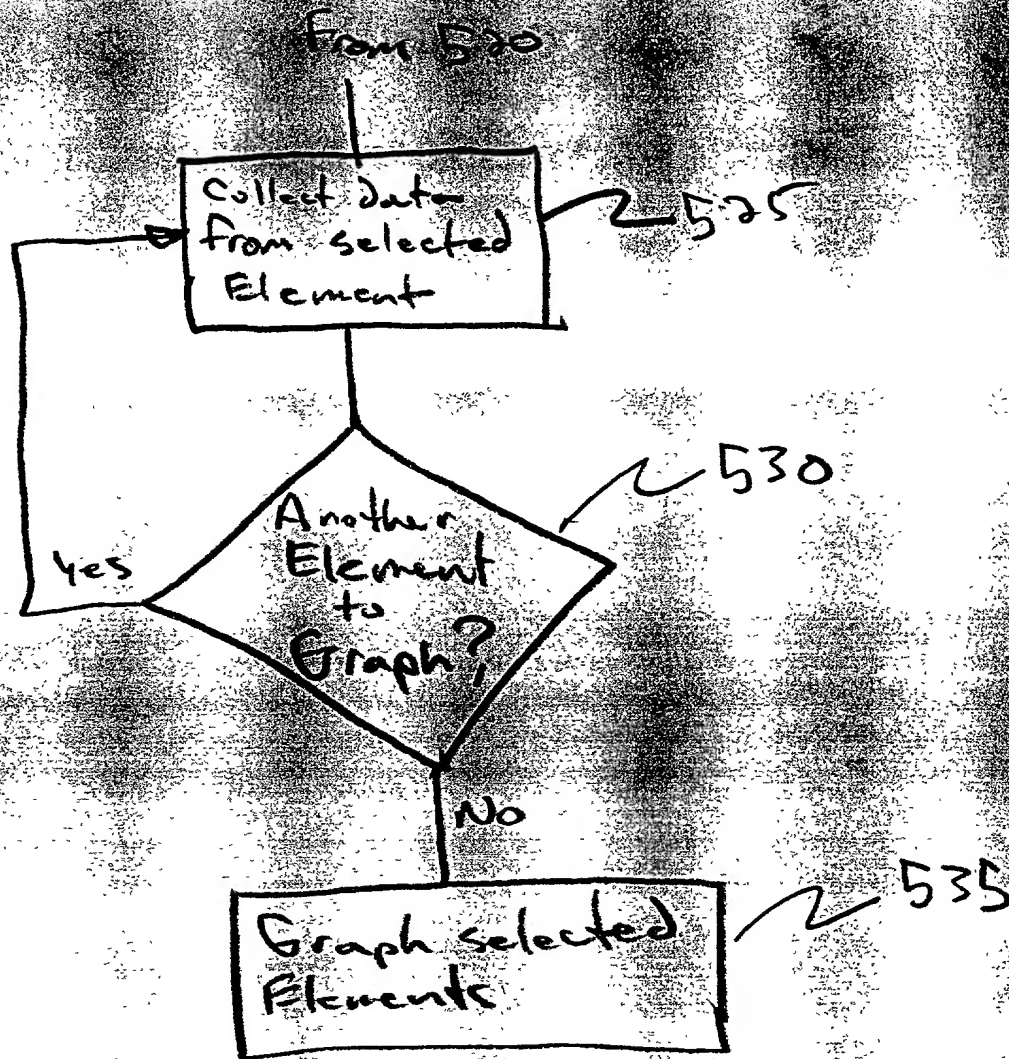


Figure 4B

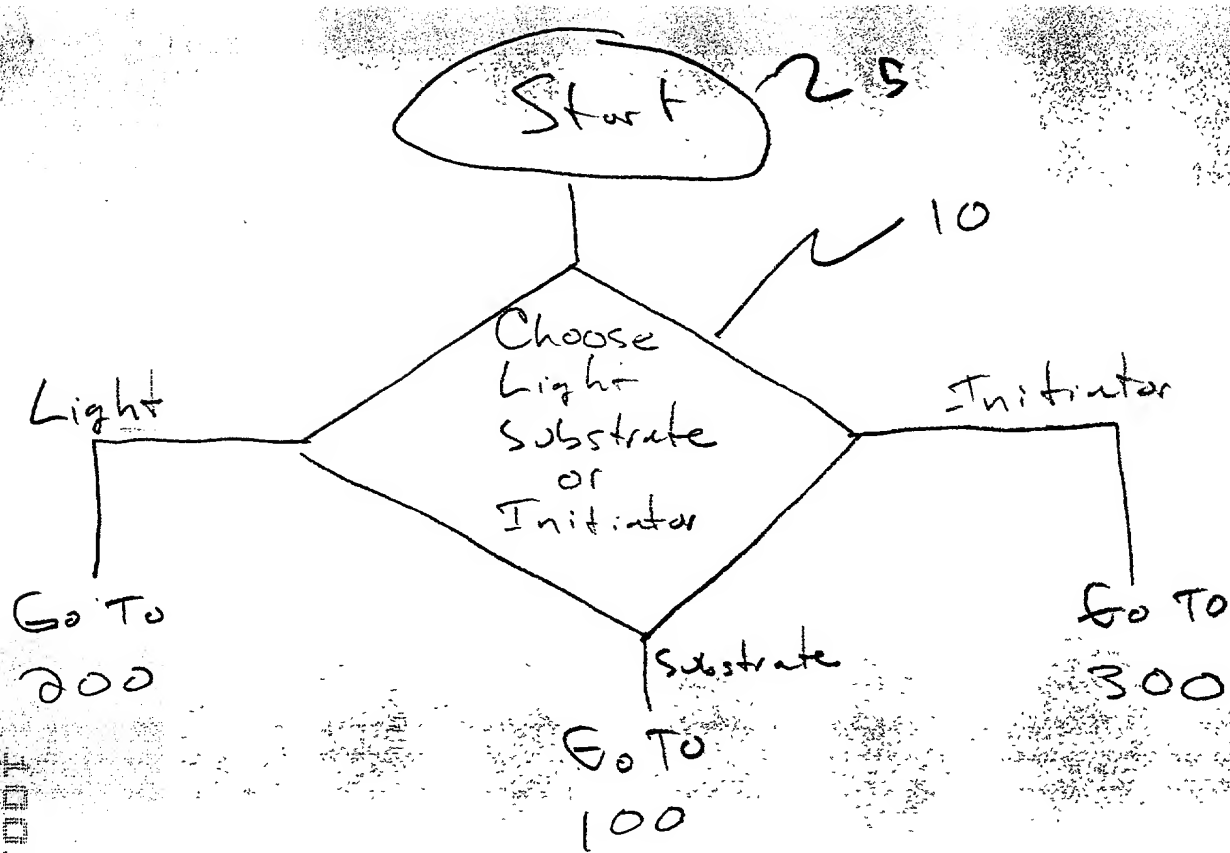
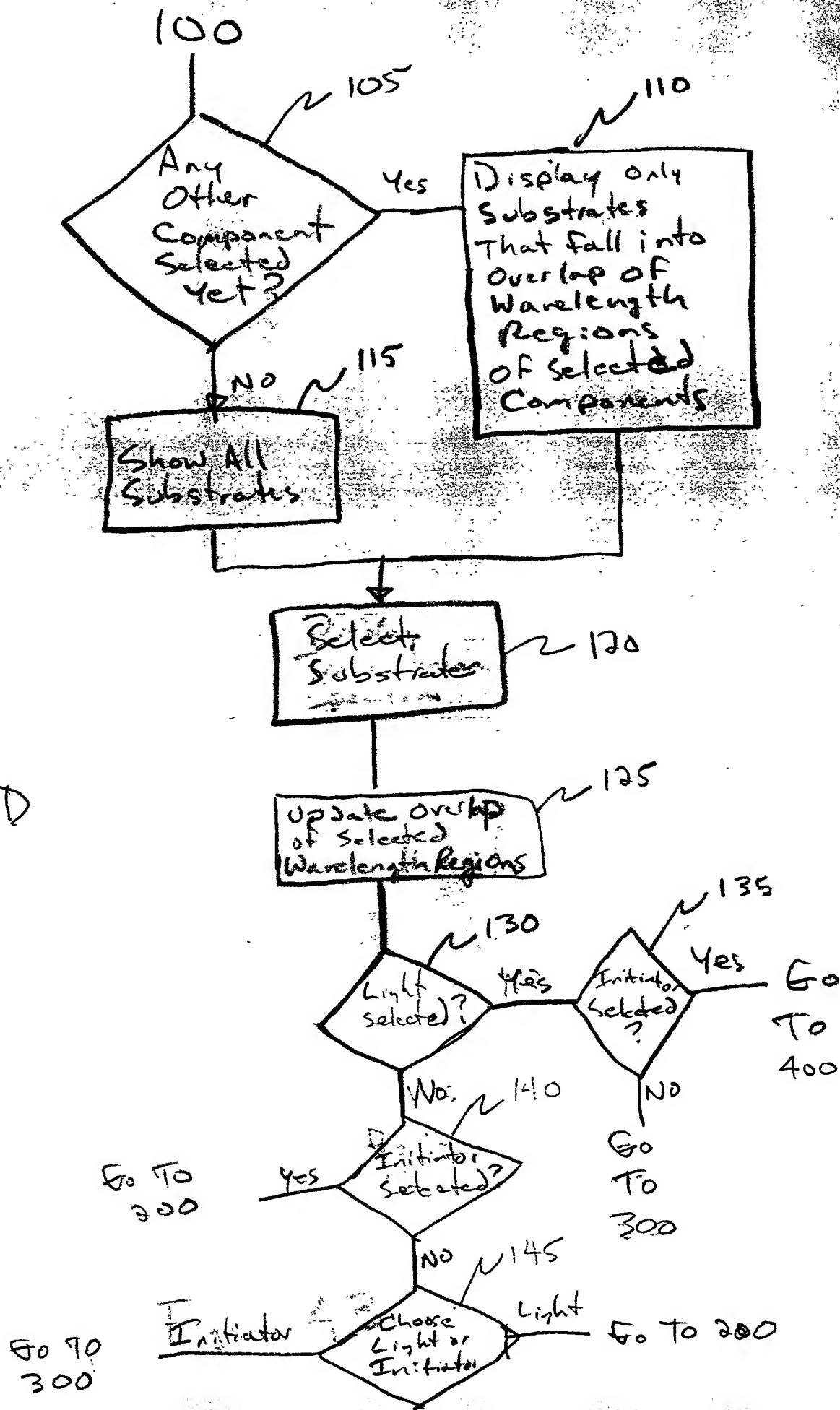


Figure 4A





10044360 102201

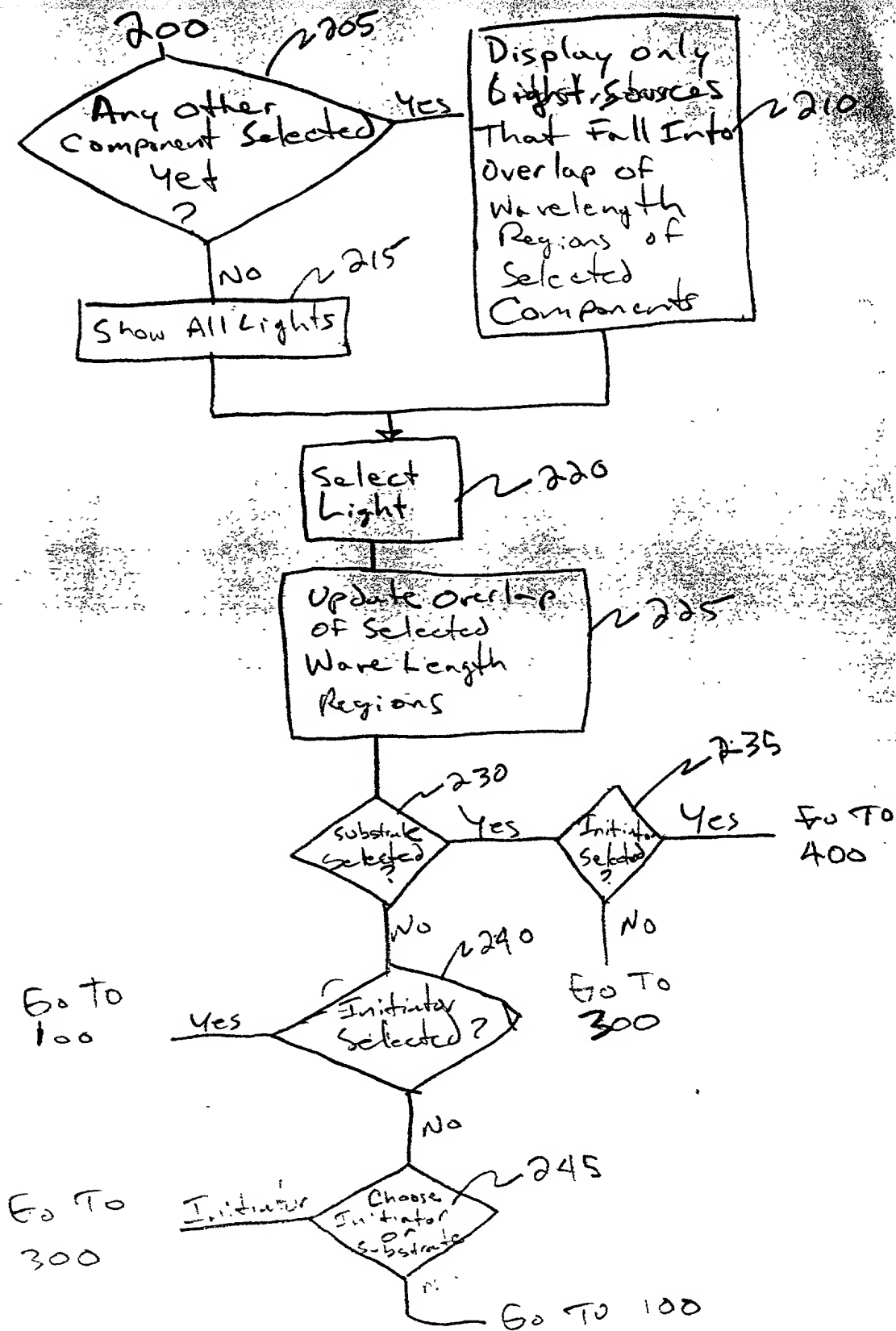


Figure 4E

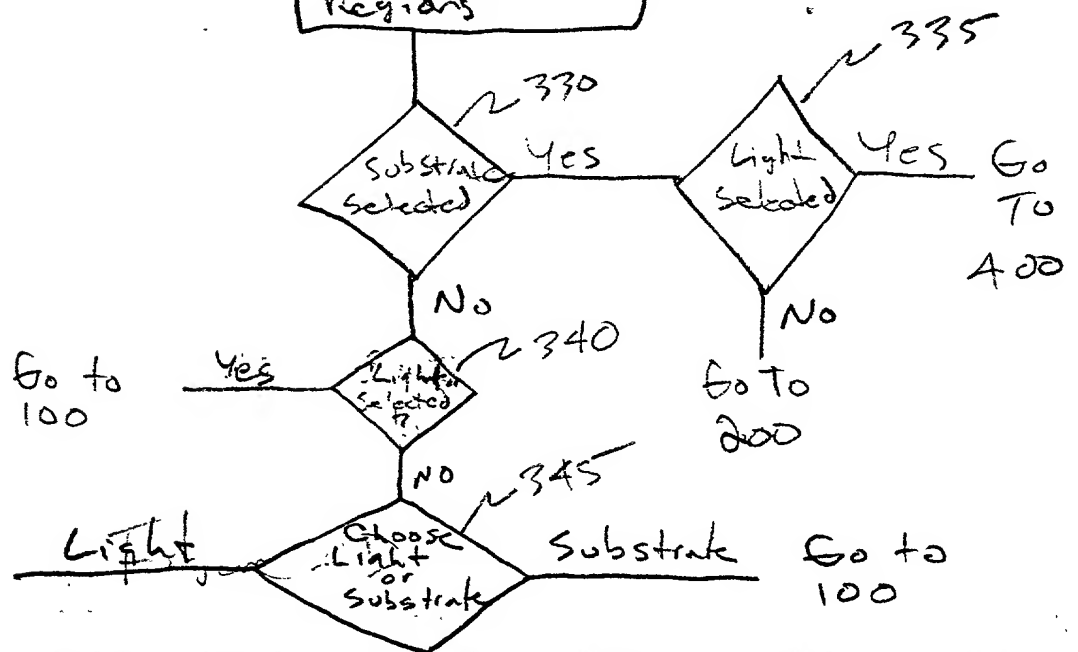
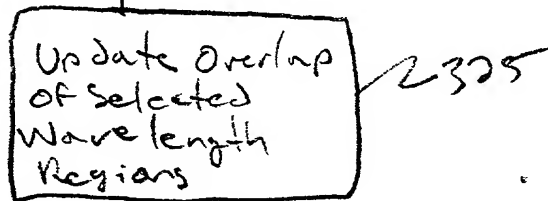
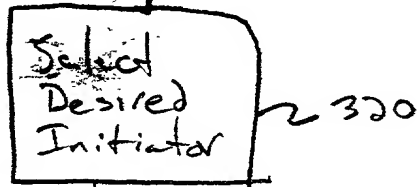
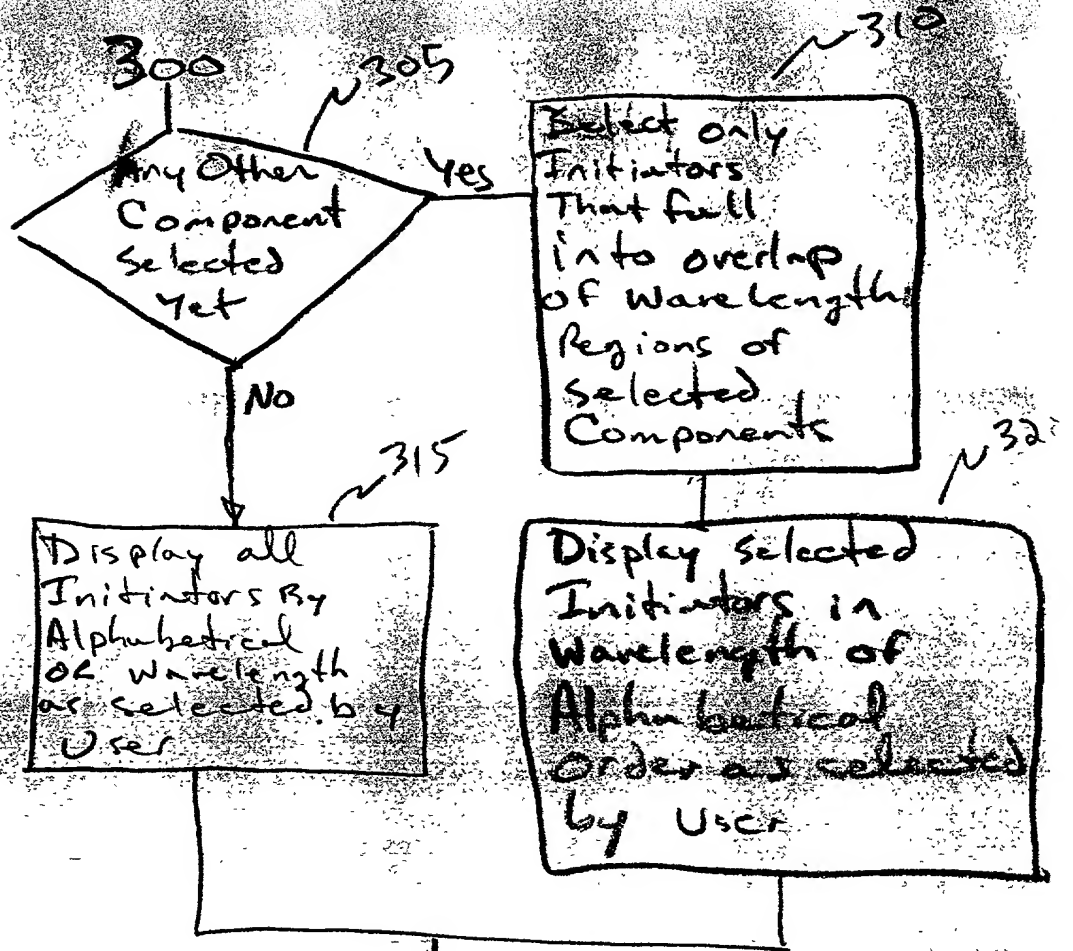


Figure 4B

1004390 102201

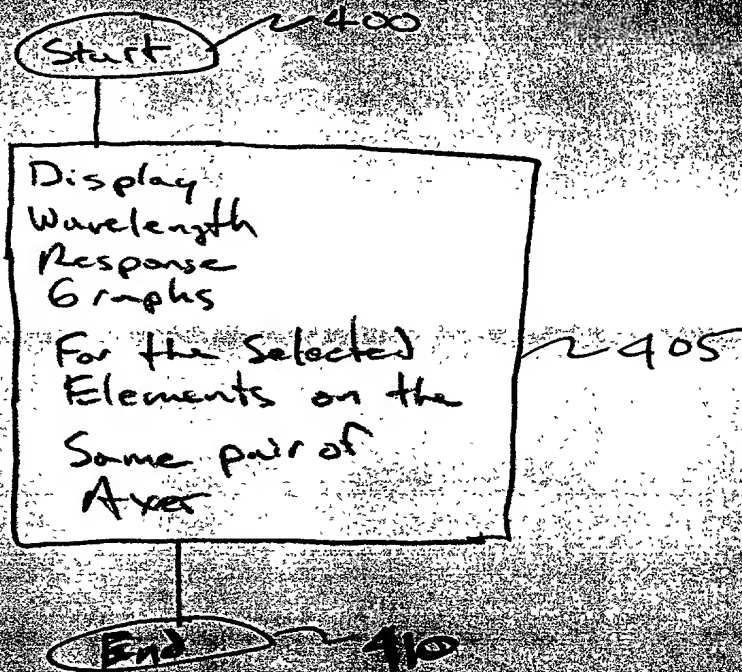


Figure 4

Rec'd 9/18/01

Figure

5 A

# Light Source Profile

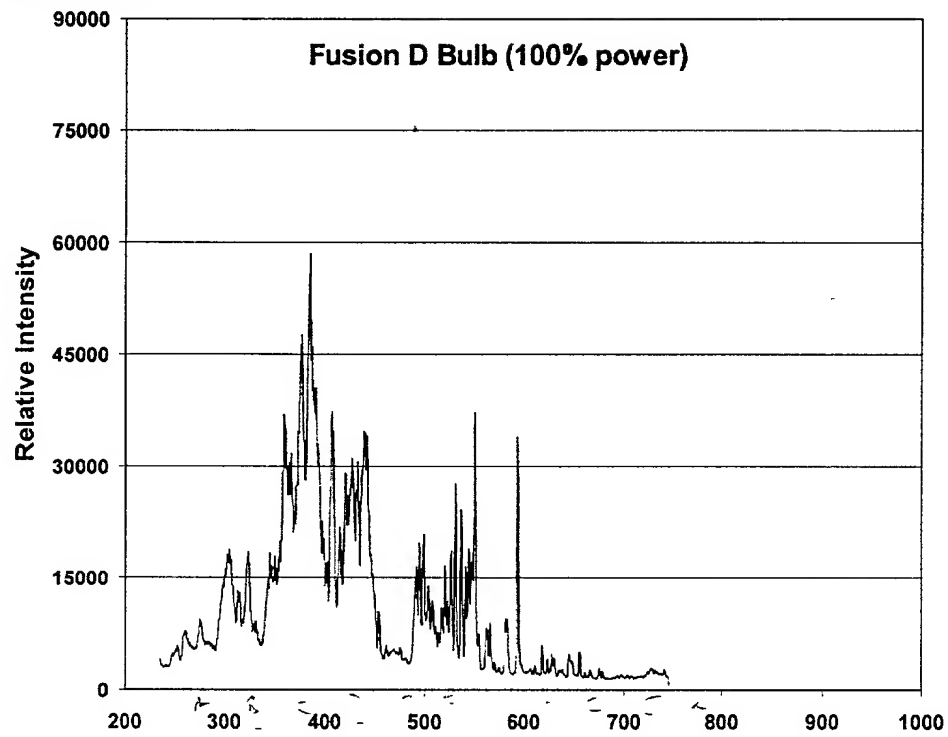
Light Sources: Fusion D Bulb  
Emiss. Wavelength 300 - 450, 500 - 600 (nm)  
Wavelength B, C, D, F, G  
Region:  
Intensity:  
Notes:

Picture of Light Source:



Fusion D 100.xls

Emiss Spectrum:



Emiss Data (Enter data from frequencies 200 - 1000 only. Enter data separated by a comma and one space (i.e. 12.3, 32.1):

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 2208, 2277, 2250, 2117, 2074, 2058, 2325, 3768, 6077, 5973, 4408, 3029, 2512, 2293, 2274,  
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 2402, 2986, 2730, 2128, 1786, 1727, 2026, 2501, 2464, 2050, 1784, 1658, 1570, 1621, 1599,  
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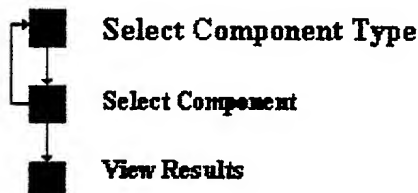
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2154, 2026, 1890, 1834, 1823, 1754, 1706, 1616, 1691, 1773, 1794, 1821, 1994, 2069, 1973,  
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1768, 1706, 1824, 1856, 1909, 1882, 1826, 1813, 1839, 1820, 1914, 1985, 1909, 1751, 1678,  
1674, 1882, 2042, 2069, 1962, 2042, 2298, 2423, 2538, 2424, 2256, 2199, 2421, 2698, 2901,  
2794, 2691, 2722, 2922, 2565, 2261, 2239, 2559, 2672, 2751, 2626, 2389, 2250, 2394, 2453,  
2365, 2152, 2026, 2143, 2330, 2282, 2175, 2069, 2000, 2104, 2421, 2735, 2880, 2708, 2536,  
2209, 2042, 1985, 1884, 1818, 1738, 1661, 618

Maximum Frequency (Enter 1000 or smaller if the frequency range is less than 1000):

746

102207 06541001

## Select a Substrate, Light Source, and/or Photo Initiator Type



This process allows you to select up to three components to view together. For each component, you must first select a component type. There are three types of components to select from (Substrate, Photo Initiator, or Light Source). After selecting the desired component type, you can then select a component of that type.

- Select the first component type from the drop-down list below and click the Next > button.

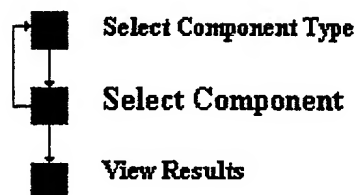
Select the first component type:

Substrate

Next >

Figure 6A

## Select a Substrate, Light Source, and/or Photo Initiator



- If you want to view more components, select a component of the selected type from the drop-down list below and click the Next > button.

- If you want to view the current component(s), select a component of the selected type from the drop-down list below and click the Finish button.

- If you want to select a different component type, click the < Back button.

Select a Substrate:

BT Epox

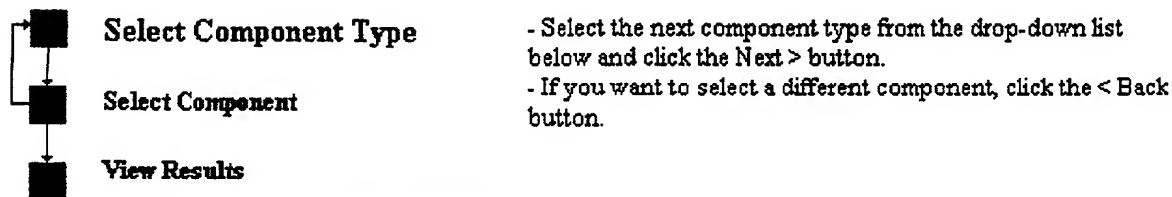
< Back

Next >

View Overlay

Figure 6B

## Select a Substrate, Light Source, and/or Photo Initiator Type

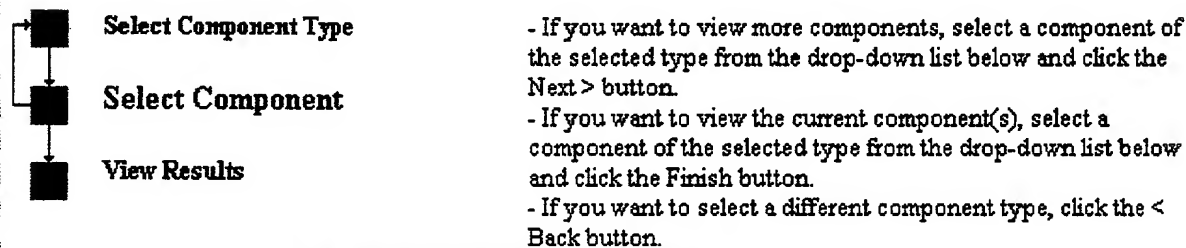


Select the second component type:

Component Type #1	Substrate
Component #1	RT Epoxy

Figure 6C

## Select a Substrate, Light Source, and/or Photo Initiator



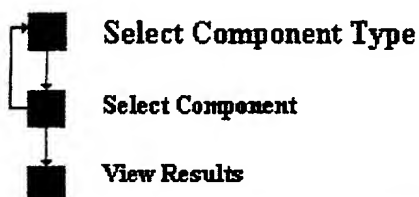
Select a Photo Initiator:

Component Type #1	Substrate
Component #1	RT Epoxy

Figure 6D



## Select a Substrate, Light Source, and/or Photo Initiator Type



- Select the next component type from the drop-down list below and click the Next > button.
- If you want to select a different component, click the < Back button.

Select the third component type:

Light Source

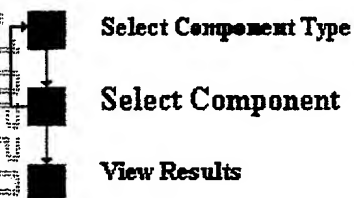
Component Type #1:	Substrate
Component #1:	BT Epoxy
Component Type #2:	Photo Initiator
Component #2:	Disperso Blue I

< Back Next >

Figure 6E

## Select a Substrate, Light Source, and/or Photo Initiator

10014350 05011001



- If you want to view more components, select a component of the selected type from the drop-down list below and click the Next > button.
- If you want to view the current component(s), select a component of the selected type from the drop-down list below and click the Finish button.
- If you want to select a different component type, click the < Back button.

Select a Light Source:

Eluepoint

Component Type #1:	Substrate
Component #1:	BT Epoxy
Component Type #2:	Photo Initiator
Component #2:	Disperso Blue I

< Back View Overlay

Figure 6F

SRC Curing Resource Center - Microsoft IE5.0/3M

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Overlay Diagram

\* To print, click on this frame first, then select "Print" from the "File" menu above. For best print results, use Internet Explorer.

The purpose of this overlay is to compare spectra and therefore the spectra have been scaled to achieve this. The transmittance of all substrates is scaled from 0-100%. In certain cases, the transmittance may appear to be nearly zero but may not actually be zero. In such cases, it may be possible to select an appropriate light source to allow the transmittance of light. The absorbance spectra of photoinitiators/sensitizers have been scaled between 0-100 to allow comparison between the transmittance spectra of the substrate and the absorbance spectra of the photoinitiators/sensitizers. The spectra of the light sources are also scaled from 0-100.

NOTE: Source spectra is uncorrected. Please contact someone from the Curing Resource Center ("Contacts" to the left) if you need further information

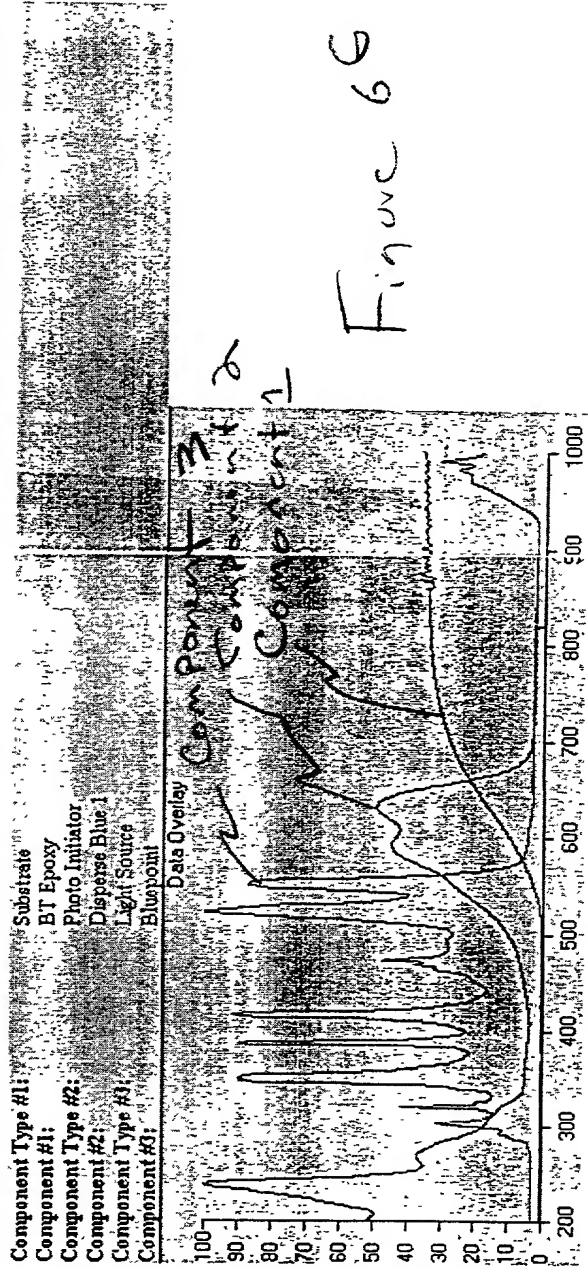


Figure 66

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\* To print, click on this frame first, then select "Print" from the "File" menu above. For best print results, us

The purpose of this overlay is to compare spectra and therefore the spectra have been scaled to achieve this. The transmittance of the substrates is scaled from 0-100%. In certain cases, the transmittance may appear to be nearly zero but may not actually be zero. In these cases, it may be possible to select an appropriate light source to allow the transmittance of light. The absorbance spectra of the photoinitiators/sensitizers have been scaled between 0-100 to allow comparison between the transmittance spectra of the substrates and the absorbance spectra of the photoinitiators/sensitizers. The spectra of the light sources are also scaled from 0-100.

NOTE: Source spectra is uncorrected Please contact someone from the Cunningham Resource Center ("Contact's" to the further information.

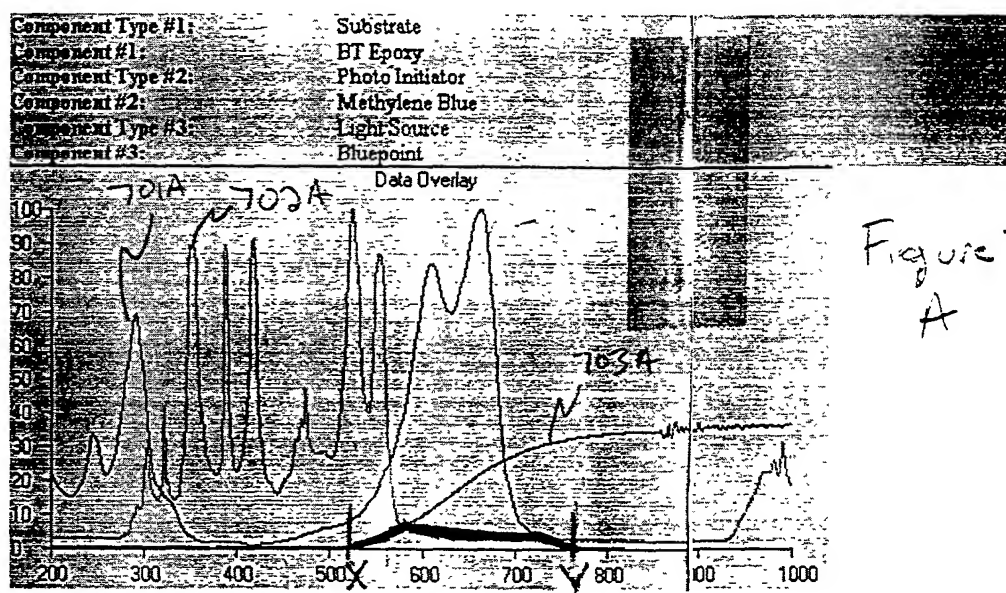


Figure T  
A

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## Overlay Diagram

\* To print, click on this frame first, then select "Print" from the "File" menu above. For best print results, use Internet Explorer.

The purpose of this overlay is to compare spectra and therefore the spectra have been scaled to achieve this. The transmittance of the substrates is scaled from 0-100%. In certain cases, the transmittance may appear to be nearly zero but may not actually be zero. In some cases, it may be possible to select an appropriate light source to allow the transmittance of light. The absorbance spectra of photoinitiators/sensitizers have been scaled between 0-100 to allow comparison between the transmittance spectra of the substrates and the absorbance spectra of the photoinitiators/sensitizers. The spectra of the light sources are also scaled from 0-100.

NOTE: Source spectra is uncorrected. Please contact someone from the Curing Resource Center ("Contacts" to the left) if you need further information.

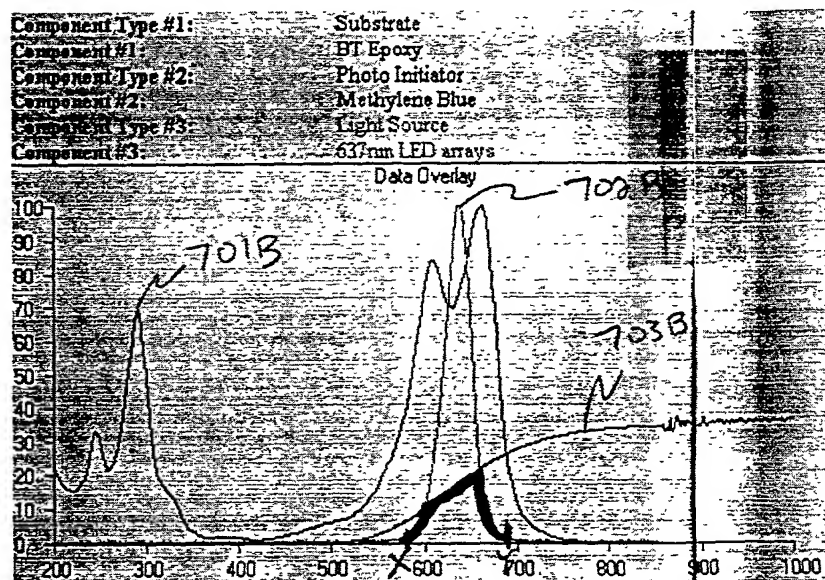


Figure 7  
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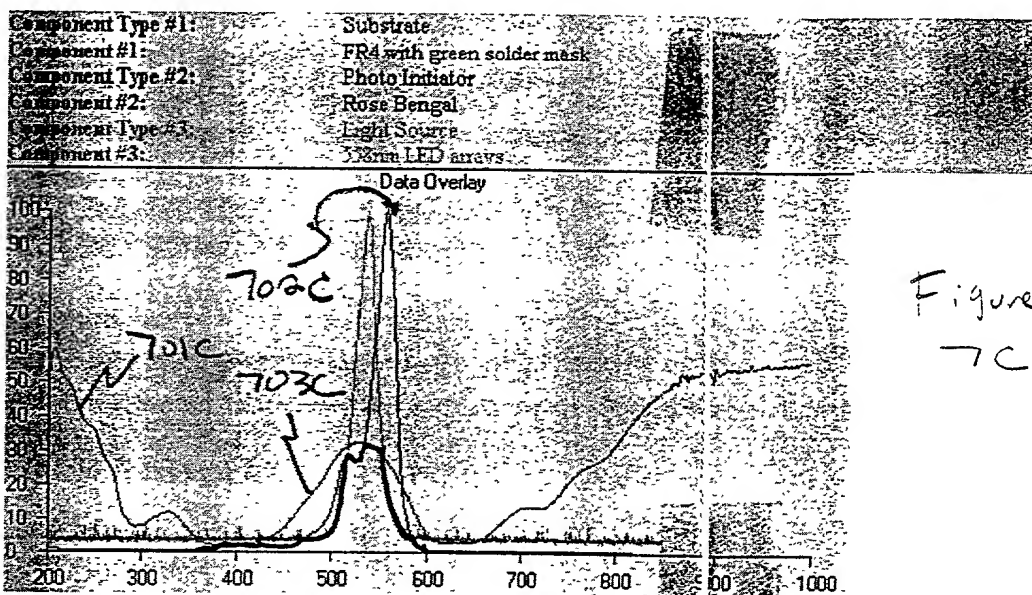
UV Stabilizers

### Overlay Diagram

\* To print, click on this frame first, then select "Print" from the "File" menu above. For best print results, us

The purpose of this overlay is to compare spectra and therefore the spectra have been scaled to achieve this. The substrate is scaled from 0-100%. In certain cases, the transmittance may appear to be nearly zero but may not actually be. In some cases, it may be possible to select an appropriate light source to allow the transmittance of light. The absorbance of photoinitiators/sensitizers have been scaled between 0-100 to allow comparison between the transmittance spectra and the absorption spectra of the photoinitiators/sensitizers. The spectra of the light sources are also scaled from 0-100.

**NOTE** Source spectra is uncorrected. Please contact someone from the Curing Resource Center ("Contacts" to the further information.



Done


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[Photo Initiators](#) [UV Stabilizers](#)

## Select a Substrate, Light Source, and/or Photo Init.

**Select Component Type**

**Select Component**

**View Results**

- If you want to view more components, select a component selected type from the drop-down list below and click the N-

- If you want to view the current component(s), select a com- the selected type from the drop-down list below and click th button.

- If you want to select a different component type, click the button.

Select a Light Source:

3M Deluxe Transparency Maker Light Source

Component Type #1	Light Source
Component #1	Dental Hardening
Component Type #2	Light Source
Component #2	Custom D Bulb

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Figure  
7D



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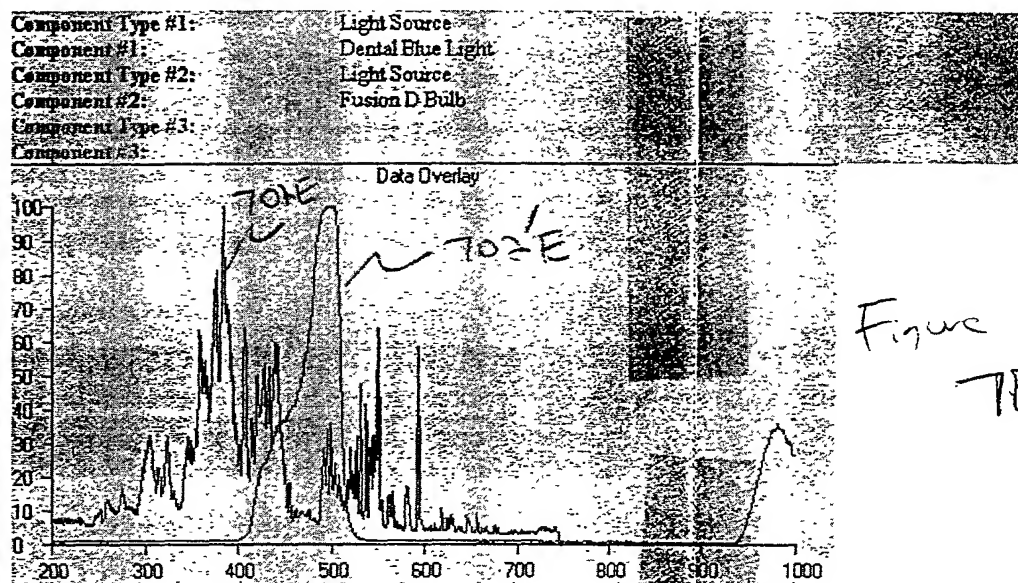
Photo Initiators	UV Stabilizers
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## Overlay Diagram

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The purpose of this overlay is to compare spectra and therefore the spectra have been scaled to achieve this. The substrates is scaled from 0-100%. In certain cases, the transmittance may appear to be nearly zero but may not actually be. In some cases, it may be possible to select an appropriate light source to allow the transmittance of light. The absorbance spectra of photoinitiators/sensitizers have been scaled between 0-100 to allow comparison between the transmittance spectra and the absorption spectra of the photoinitiators/sensitizers. The spectra of the light sources are also scaled from 0-100.

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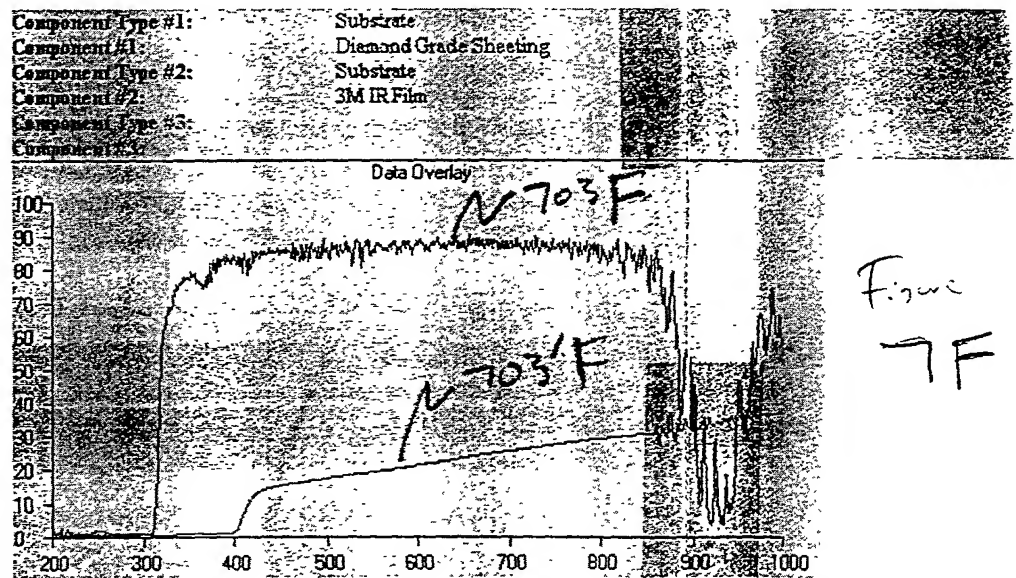
Combined	Substrates	Light Sources
Photo Initiators	UV Stabilizers	

## Overlay Diagram

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The purpose of this overlay is to compare spectra and therefore the spectra have been scaled to achieve this. The substrate is scaled from 0-100%. In certain cases, the transmittance may appear to be nearly zero but may not actually be, it may be possible to select an appropriate light source to allow the transmittance of light. The absorbance of photoinitiators/sensitizers have been scaled between 0-100 to allow comparison between the transmittance spectra of the absorption spectra of the photoinitiator/sensitizers. The spectra of the light sources are also scaled from 0-100.

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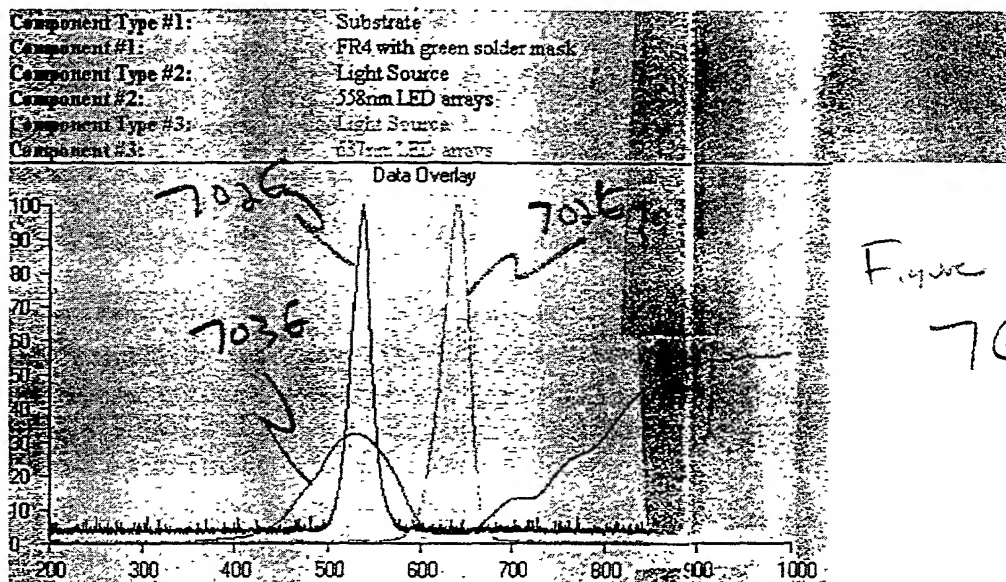
UV Stabilizers

## Overlay Diagram

\* To print, click on this frame first, then select "Print" from the "File" menu above. For best print results, us

The purpose of this overlay is to compare spectra and therefore the spectra have been scaled to achieve this. The substrate is scaled from 0-100%. In certain cases, the transmittance may appear to be nearly zero but may not actually be. The absorbance spectra of the photoinitiators/sensitizers have been scaled between 0-100 to allow comparison between the transmittance spectra of the substrates and the absorption spectra of the photoinitiators/sensitizers. The spectra of the light sources are also scaled from 0-100.

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## Top of Light Source Profile

**Light Sources:** Bluepoint  
**Emit. Wavelength** 300 - 600, 940 - 1150  
**(nm)**  
**Wavelength Region:** C, D, E, F, G  
**Intensity:**  
**Notes:**

Picture of Light Source:



bluepoint light source.xls

Emit Spectrum:

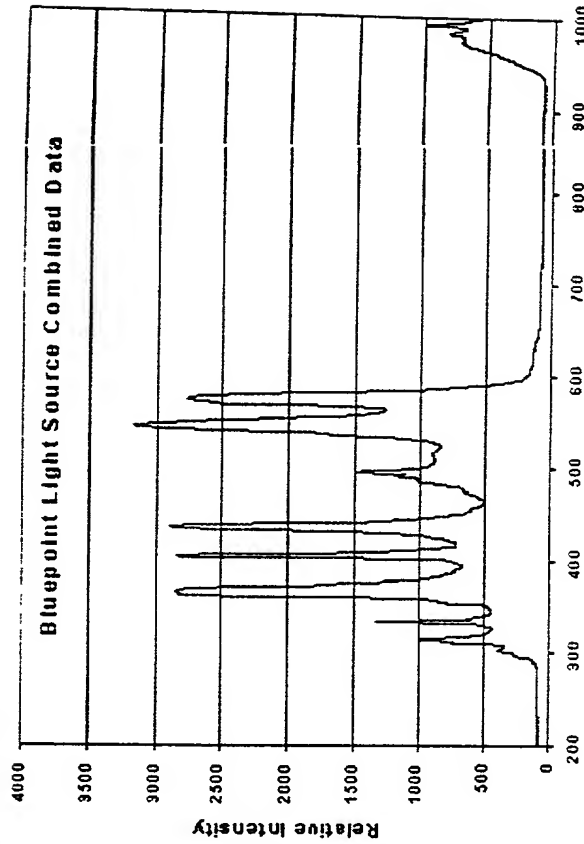


Figure - II

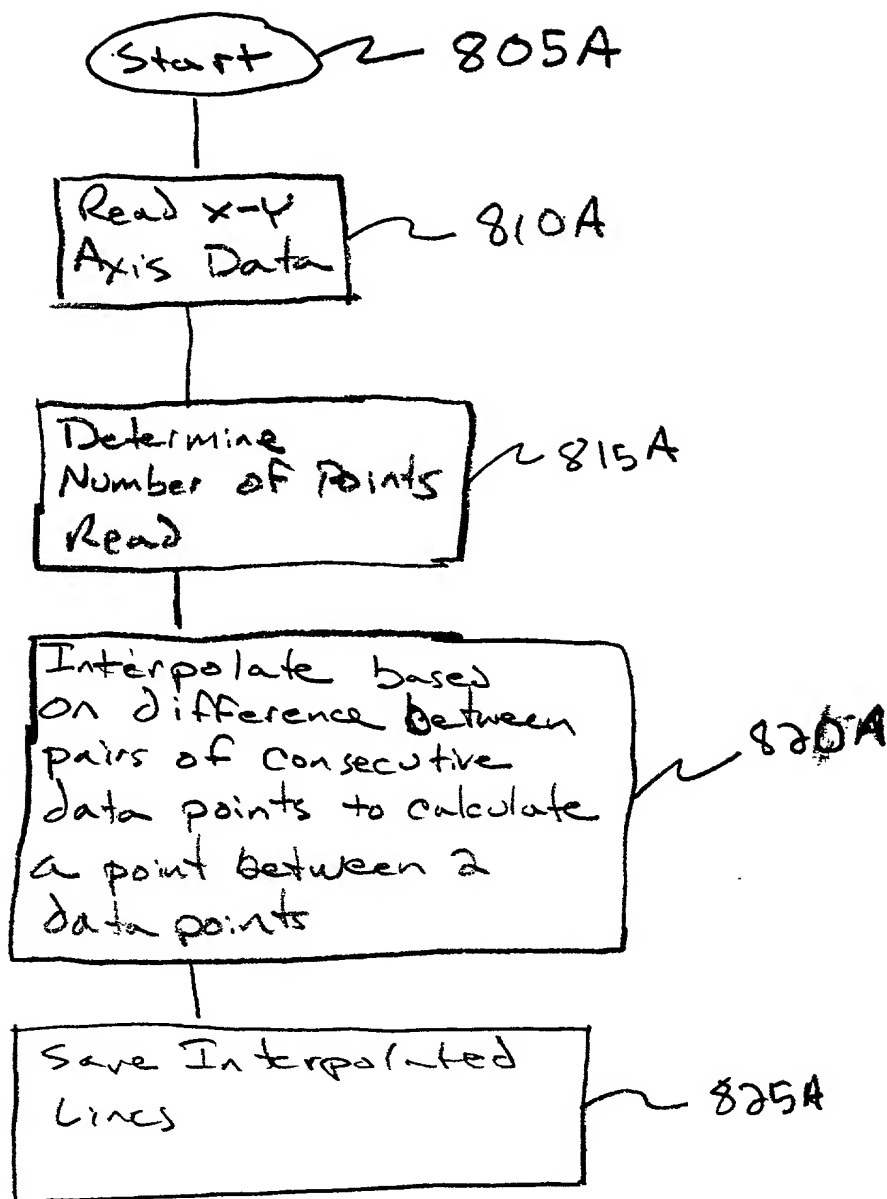


Figure 8A

Baseline

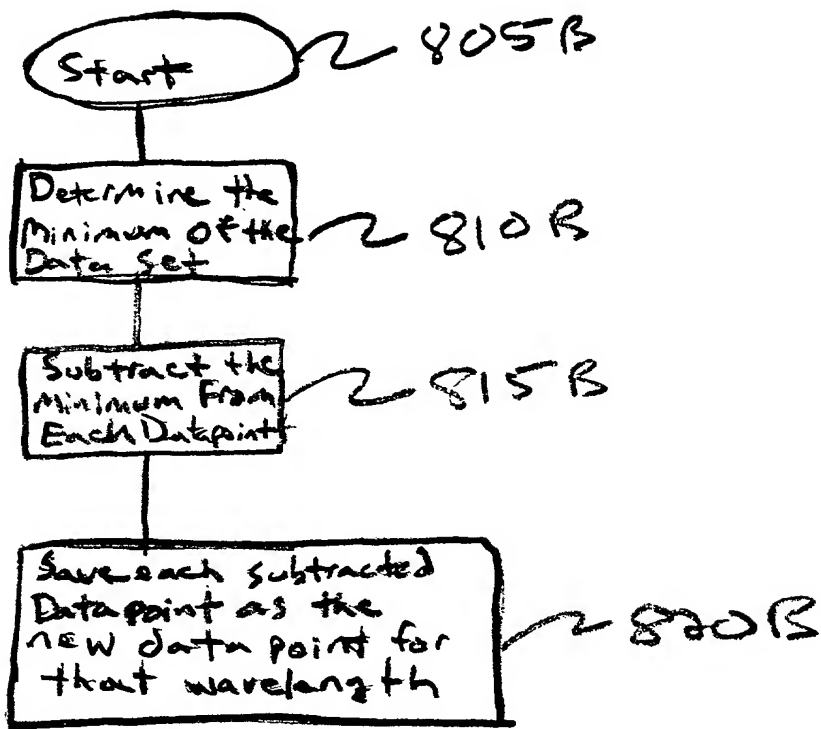


Figure 8 B

Norm

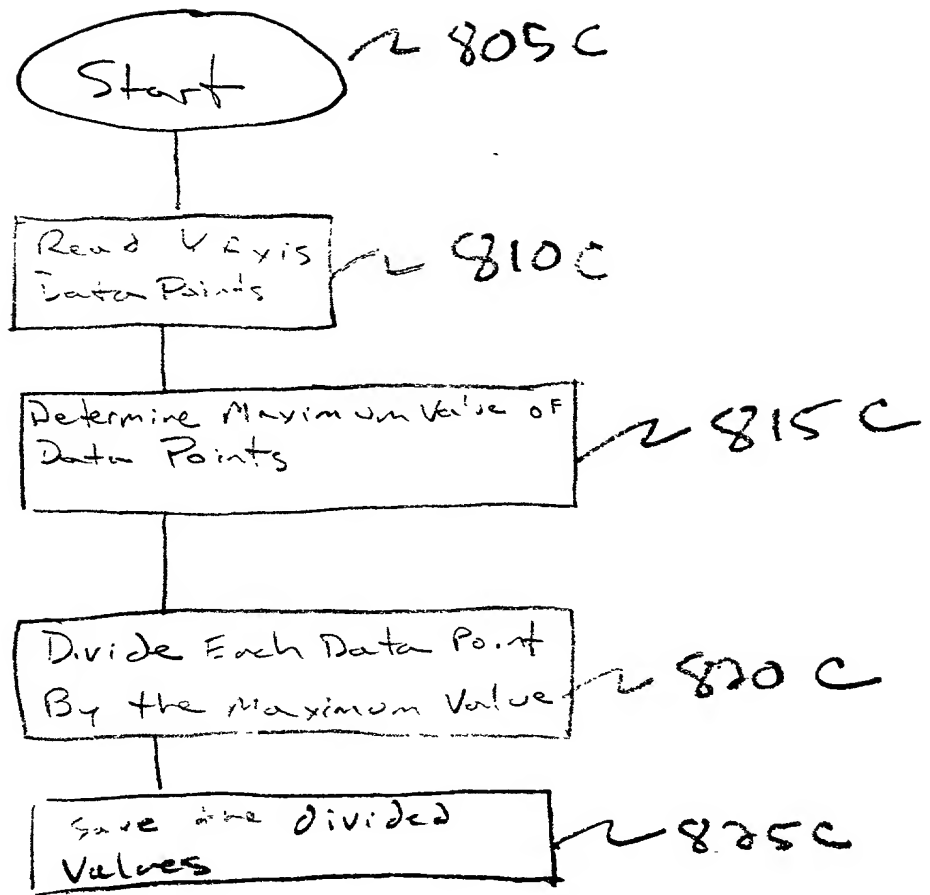


Figure 8C

10014390 102201

Integrate

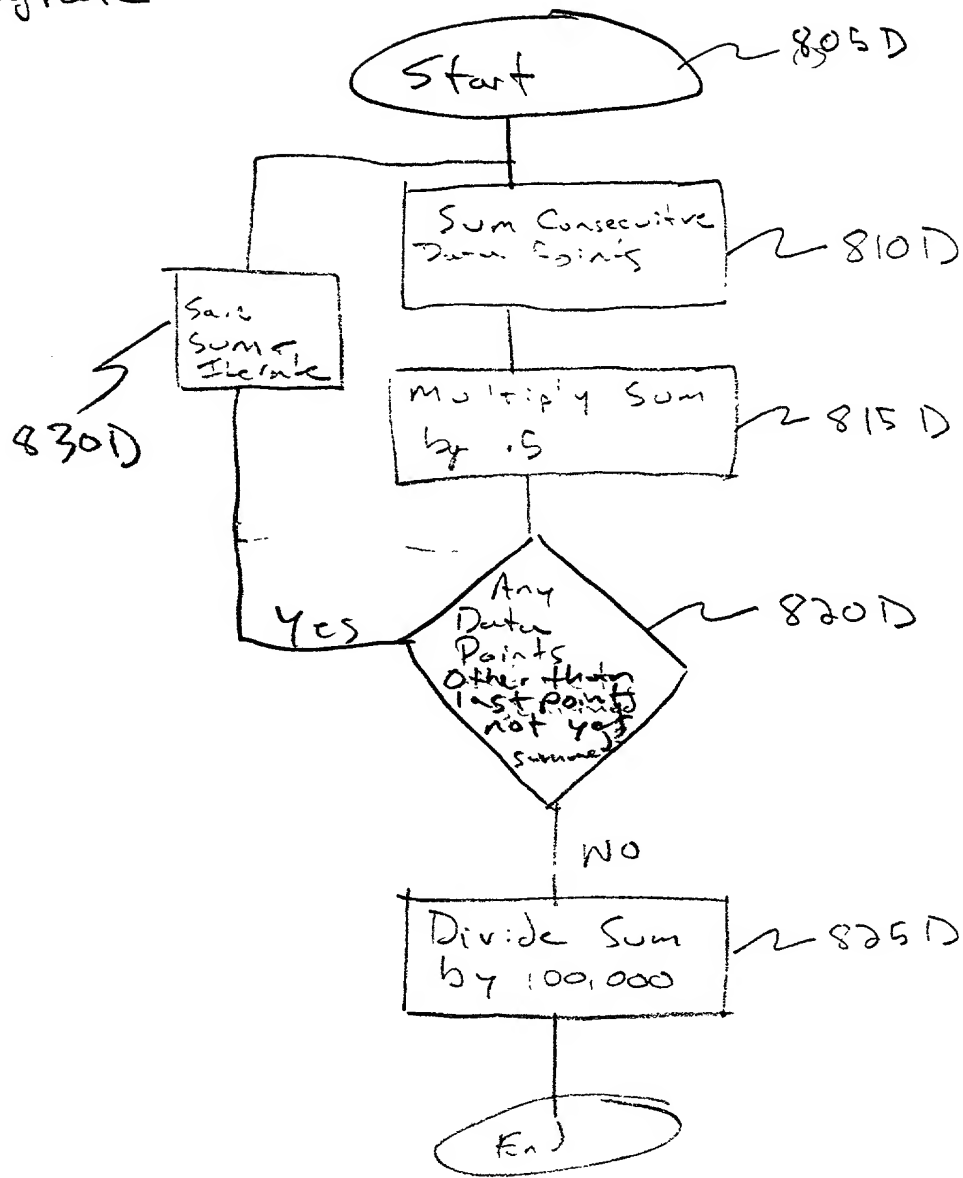


Figure 8D

10044390 102204

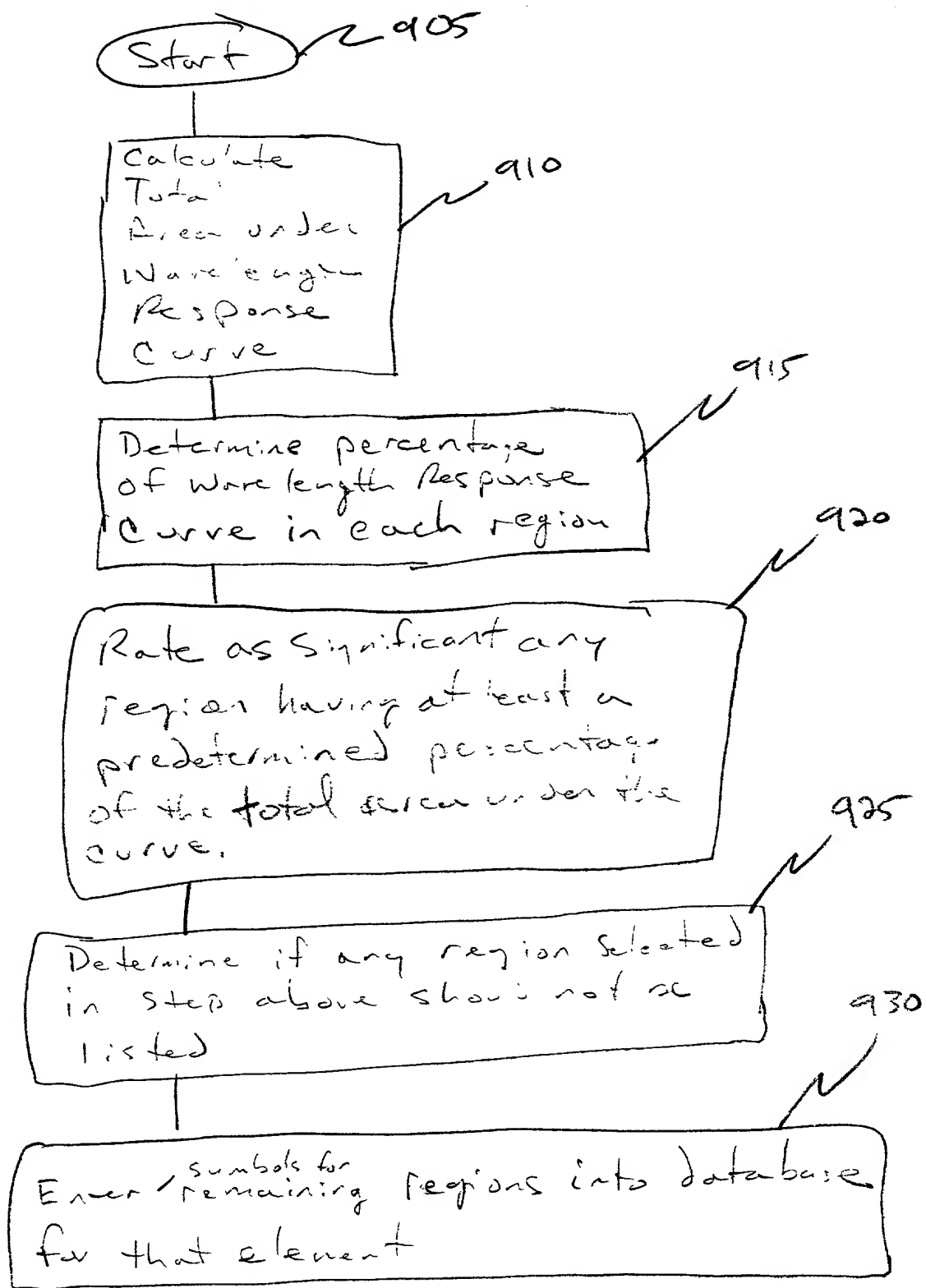


Figure 9



10044390.102201

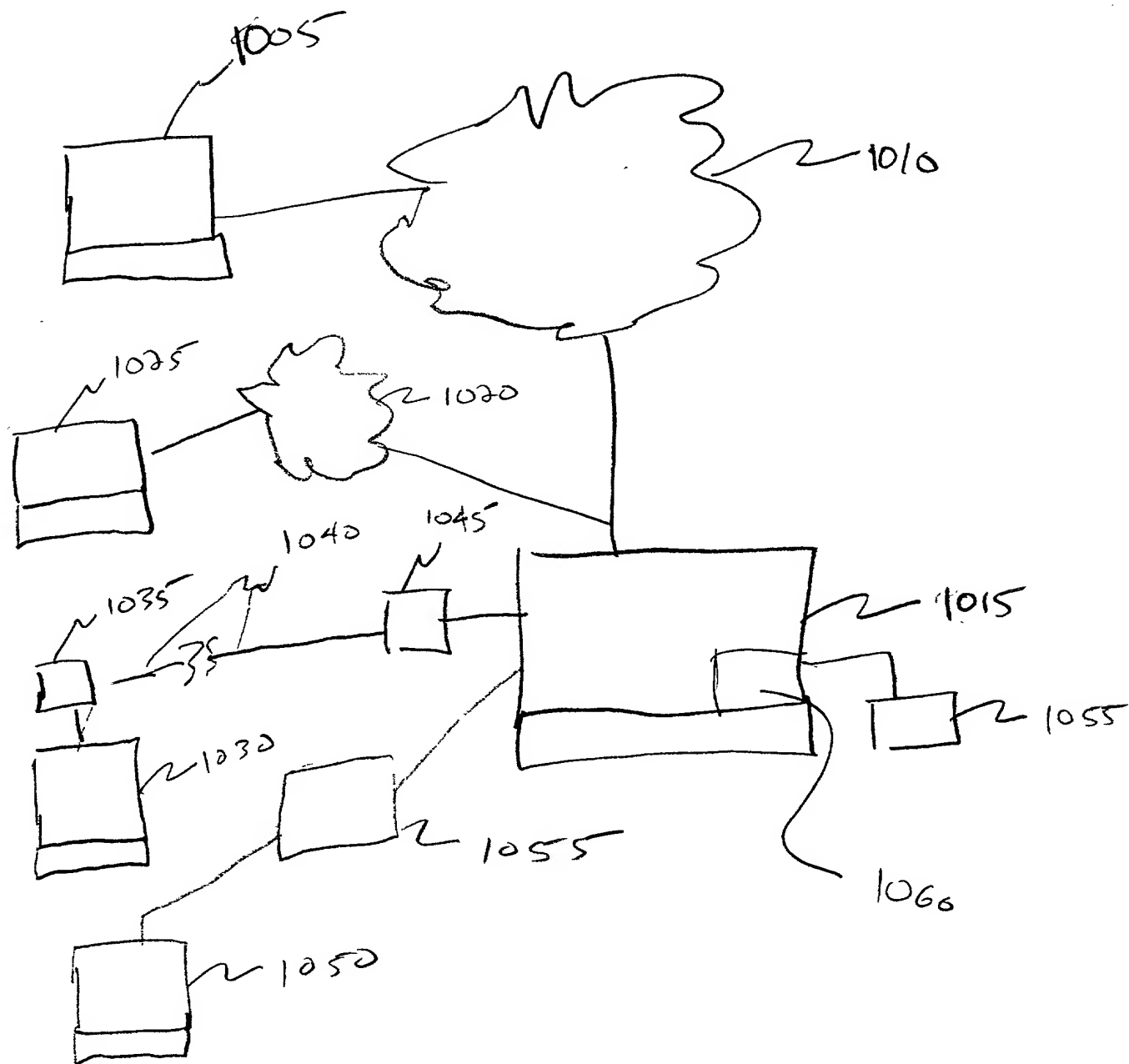


Figure 10

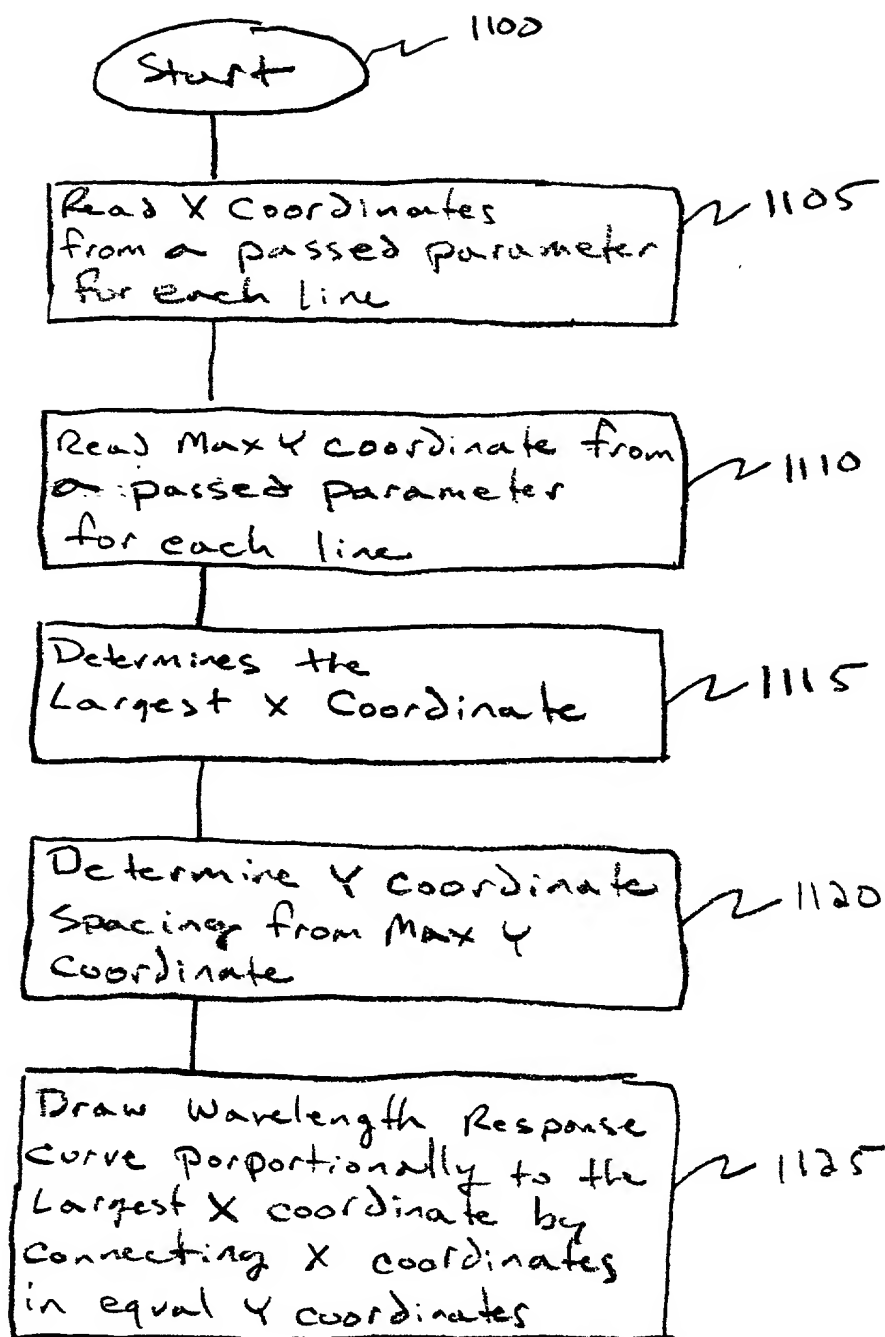


Figure 11.